

20. (new) The apparatus of claim 9, wherein:
said vanes comprise a plurality of paddles.

In the drawings:

Please amend drawing FIGs. 5 and 8 in accordance with the red-lined drawings enclosed herewith and add new drawing FIG. 9.

Remarks

The examiner has objected to the specification on the ground that various informalities require correction. Applicants have made the suggested corrections with the exception of the correction suggested within lines 15-16 of page 5. Applicants respectfully draw the Examiner's attention to FIGs. 2 and 2A, wherein the inner end 42 of air hose 12 is shown. The Examiner has also objected to the specification on the grounds that it fails to make specific reference to the parent application. The specification has been amended accordingly.

The Examiner has objected to the drawings on the grounds that claimed subject matter is not shown and that the drawings do not include certain reference numbers. Applicants have amended FIGs. 5 and 8 and has added new FIG. 9. Support for FIG. 9 is found in the specification at page 10 and in the claims as originally filed.

Claims 1-16 are pending in the application. Claims 1-16 stand rejected. Applicants have amended the claims in order to overcome the rejections and to address the informality in claim 1. Claims 1, 3, 5, 7, 9, 11, and 15 stand rejected under 35 U.S.C. § 102(e) as being anticipated by United States Patent No. 5,186,289 to Wolner. The Wolner reference also constitutes a prior art reference under 35 U.S.C. § 102(b). Accordingly, applicants' amendment and the remarks herein apply equally to the Wolner reference as a 102(e) or 102(b) reference.

Wolner discloses a reel for retracting a safety line comprising a *centrifugal* clutch that engages a viscous braking mechanism when the *speed* at which the safety line *is being paid out* exceeds a threshold velocity. [Wolner column 4, lines 29-41]. In contradistinction, the present application discloses and claims a reel for retracting an elongate member comprising a

unidirectional clutch that engages a viscous damper in which not only is the engagement irrespective of speed, but the engagement occurs when the elongate member is being retracted. Accordingly, Wolner lacks at least the element of the "unidirectional clutch operating to disengage said viscous clutch assembly when said spool is rotated in said first rotational direction, thereby permitting the paying out of said elongate member from said spool without said viscous clutch exerting a substantial retarding torque, said unidirectional clutch assembly further operating to engage said viscous clutch assembly such that said viscous clutch exerts a retarding torque between said spool and said frame for limiting rotational velocity of said spool when said spool is rotated in a second rotational direction for rewinding said elongate member onto said spool" contained in amended claim 1.

Wolner also lacks at least the element of the "unidirectional clutch means comprising means for disengaging said viscous clutch assembly when said spool is rotated in said first rotational direction for paying out said elongate member, thereby permitting said spool to rotate without said viscous clutch exerting a substantial retarding torque, said unidirectional clutch means further comprising means to engage said viscous clutch assembly such that said viscous clutch exerts a retarding torque between said spool and said frame for limiting rotational velocity of said spool when said spool is rotated in said second rotational direction for retracting said elongate member" contained in amended claim 9.

Wolner also lacks at least the element of the "unidirectional clutch assembly operatively disposed between said spool and said support frame, said unidirectional clutch assembly operating to disengage said viscous clutch assembly when said spool is rotated in said first rotational direction and to engage said viscous clutch assembly when said spool is rotated in said second direction such that said viscous clutch exerts a retarding torque on said spool for limiting a rotational velocity of said spool when said spool is rewinding said elongate member but does not exert a retarding torque on said spool when said spool is paying out a length of said elongate member." contained in new claim 17.

Because Wolner does not disclose, among other things, a unidirectional clutch assembly that engages a viscous clutch when the reel is *retracting* an elongate member, Wolner does not anticipate any of claims 1, 9, or 17 as amended and, therefore, applicants urge these claims are allowable.

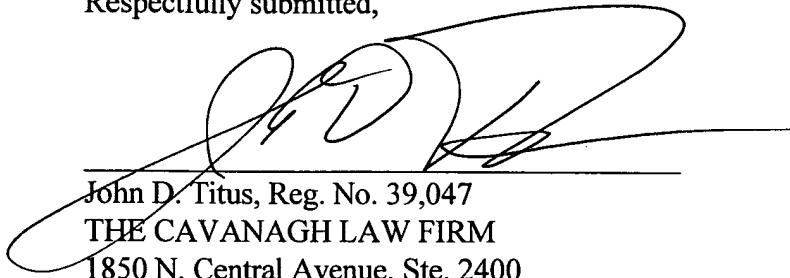
Claims 8 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolner in view of U.S. patent No. 4,722,422 to Hiraoka. Applicants respectfully traverse the rejection. It is well settled that when combining references under § 103 in order to show an invention obvious over the prior art, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification and a rejection based on such a proposed combination is improper. MPEP 2143.01; In Re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). As noted hereinbefore, the primary reference, Wolner, comprises a safety line reel comprising a clutch that engages a viscous braking mechanism when the *speed* at which the safety line *is being paid out* exceeds a threshold velocity. The purpose of the safety reel disclosed by Wolner is to permit a construction worker to move about freely with the safety line retracting and paying out as the worker moves about, but to engage in the event of a fall when the speed at which the safety line *is being paid out* exceeds a threshold level, indicating a fall. The present invention comprises just the opposite. The present invention comprises a clutch that engages a viscous damper when the cable is being retracted, *but disengages the viscous damper when the cable is being paid out*. Combining Wolner with Hiraoka to arrive at the present invention would render the Wolner invention unsatisfactory for its intended purpose because it would make the Wolner invention engage the brake while the cable was retracting, but disengage the brake when the cable is being paid out, thereby allowing the worker to freefall to his or her death.

Conclusion

Attached hereto is a marked up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

No new matter is introduced by the amendments herein. Based on the foregoing, applicants believe that all claims under consideration are in a condition for allowance and reconsideration of this application is respectfully requested.

Respectfully submitted,



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Version with markings to show changes made

Beginning on page 1 line 5:

This application is a continuation-in-part application of Application No. 09/323,300, now United States Patent No. 6,234,417.

Beginning on page 5 line 4:

With reference to FIG. 2, reel 24 of reel assembly 10 comprises outer-reel half 24A and inner-reel half 24B which are secured together to form a reel 24 having a substantially cylindrical body portion 26 with radially extending flange portions 28 and 30 at the respective inner and outer ends thereof. Reel 24 is supported for rotation by a stationary support shaft 32 attached to subframe 34. Subframe 34 in turn may be mounted to a wall, frame, or to the interior surface of an enclosure such as enclosure 14 shown in FIG. 1. Disposed within cylindrical body portion 26 is a spring can 36 in which is housed a conventional multiple turn torsional spring 38. Spring 38 may be a spiral wound spring similar to a watch spring, or may be a conventional negator spring. The outer end of torsional spring 38 is secured to spring can 36. The inner end of torsional spring 38 is secured to stationary shaft 32 by means of a slot and setscrew, keyed hub, or other conventional means. Spring can 36 is secured within body portion 26 by a plurality of studs 40 passing through corresponding apertures 42 in inner and outer reel halves 24A and 24B. Inner-end 42 of air hose 12 is coupled to inlet line 18 by means of a conventional swivel joint 44 via elbow fitting 46. (In an alternative embodiment of reel assembly 10 in which an electrical cord is wound about reel 24, a conventional slip-ring connector 47 is substituted for swivel joint 44. In another alternative embodiment of reel assembly 10 in which rope or cable is wound about reel 24, no rotating connection is required). Terminal end ~~[22]~~ 20 of air hose 12 may be equipped with a conventional hose stop 48 to prevent air hose 12 from being withdrawn completely into cabinet 14. A snubbing roller 52 is attached to subframe 34 to act as a guide to constrain air hose 12 to wind onto reel 24. A uni-directional viscous clutch assembly 50 discussed more fully hereinafter, is disposed between reel 24 and support shaft 32 to provide a viscous retarding force

that governs the retraction speed of reel 24 but does not inhibit the free paying-out of hose 12 from reel 24.

Beginning on page 5, line 27:

FIG. 3 is an exploded perspective view of a viscous clutch assembly 50 incorporating principles of the present invention. Viscous clutch assembly 50 comprises a housing 54 having apertures 56 adapted to be bolted to corresponding apertures 58 passing through outer and inner reel halves 24A and 24B (FIG. 2). Housing 54 includes an annular chamber 60 having a radially inward wall 62 and a radially outward wall 64. A unidirectional clutch assembly 66 includes a collar member 68 and a unidirectional clutch 70. Unidirectional clutch 70 is ~~[a]~~ press-fit ~~[in]~~ into bore 72 of collar member 68 and/or may be retained by conventional anaerobic adhesives such as LOCTITE, such that unidirectional clutch 70 is rigidly attached to collar member 68 without the possibility of rotation therebetween. Unidirectional clutch assembly is disposed in chamber 60 such that keyed surface 74 is completely within chamber 60 while sealing surface 76 protrudes beyond flush with surface 78 of housing 54. A radial seal such as a conventional O-ring 80 seals inner-bore 72 of collar member 68 to radially inward wall 62 of chamber 60 thereby providing a fluid tight seal therebetween.

Beginning on page 6, line 10:

A plurality of vanes are disposed in chamber 60 to provide the viscous damping action, for example, in the illustrative embodiment, the vanes constitute stator disks 82 and rotor disks 84 each comprising disks of a hollow substantially circular cross-section that are disposed in chamber 60 in an alternating fashion with the rotor disks attached to the housing 54 and the stator disks 82 interleaved therebetween and attached to the collar member 68 to form a plurality of annular gaps between stator disks 82 and rotor disks 84. In the embodiment of FIG. 3, the rotor disks are attached to housing 54 by means of a plurality of tabs 86 extending radially outward from rotor disks 84 engaging a plurality of corresponding slots 88 formed in radially outward wall 64 of chamber 60, however, other means of attaching the rotor disks 84 to housing 54 such as splines, clips, adhesives, or other conventional methods are within the scope of the invention. Accordingly, as used herein, the term "attached" when used with reference to the interaction

between the housing 54 and the rotor disks 84 means rigidly attached or attached in such a way so as to preclude substantial rotation therebetween. As used herein with reference to stator disks 82 and rotor disks 84, a hollow "substantially circular" cross-section means that the majority of the surface area of the disks lie[s] within a hollow circular region defined by an inner radius and an outer radius, but does not preclude the presence of splines, tabs or other irregularities along the inner and outer radii.

Beginning on page 7, line 20:

FIG. 4 is an end view of one unidirectional clutch assembly 66 comprising a ramp-and-ball or ramp-and-roller overrunning clutch assembly. In the embodiment of FIG. 4, collar member 68 and unidirectional clutch 70 are disposed about support shaft 32. Unidirectional clutch 70 comprises a plurality of balls or rollers 104 disposed within a cavity 106 defined by outer surface 108 of support shaft 32 and inner cylindrical surface 110 of unidirectional clutch 70. Outer surface 108 comprises a series of ramps 112 arranged in a saw tooth pattern around the perimeter of surface 110. The ramps are arranged such that the radial clearance between outer surface 108 of support shaft 32 at each of the tips 114 of ramps 112 is less than the diameter of rollers 104 and the radial clearance between surface 108 of shaft 32 and the root 116 of ramps 112 are greater than the diameter of rollers ~~114~~ 104. Accordingly, as collar member 68 is rotated in the direction indicated by arrow A in FIG. 4, rollers 104 are jammed between outer-surface 108 of shaft 32 and inner-surface 110 of collar member 68 thus preventing substantial rotational motion between collar member 68 and shaft 32 (i.e. no more rotation than is necessary to effect the initial lock-up). Conversely as collar member 68 is rotated opposite the direction indicated by arrow A, roller members are freed to assume the orientation shown in FIG. 4 which permits them to slide easily over shaft 32 thereby providing substantially no resistance (i.e. other than ordinary friction) between collar member 68 and shaft 32 thereby permitting collar member 68 to freewheel about shaft 32.

Beginning on page 8, line 8:

Although the embodiment of FIG. 4 comprises a ramp-and-ball or ramp-and-roller type of unidirectional clutch, other unidirectional clutch assemblies may be advantageously used in

accordance with the principles of the present invention. As shown in FIG. 5, a ratchet and pawl clutch comprising ratchet gear 140 and ratchet pawl 142 may advantageously be used to provide the desired unidirectional clutching action. In the embodiment of FIG. 5, ratchet pawl 142 is attached to outer reel 24A and engages ratchet gear 140, which is keyed to shaft 144. Shaft 144 is in turn keyed to stator disks 82 (FIG. 3) of viscous clutch assembly 50 which, in turn, is supported by subframe 34. Although both the embodiment of FIG. 3 and the embodiment of FIG. 4 effect an operative unidirectional viscous damping between the reel and the support, in the embodiment of FIG. 3 the unidirectional viscous damping is effected by the unidirectional clutch disengaging the viscous damper from the support. In contradistinction, in the embodiment of FIG. 4, the unidirectional viscous damping is effected by the unidirectional clutch disengaging the reel from the viscous clutch.

Beginning on page 9, line 1:

FIG. 7 depicts an alternative embodiment in which the unidirectional clutch comprises a helical spring clutch 170. Helical spring clutch 170 comprises a helical spring 172 that has a slight interference fit over hub 174 and hub 176. As can be determined with reference to FIG. 7 if the relative rotation of hub 174 relative to hub 176 is opposite the direction of wind of helical spring 172, spring 172 will tend to expand and transmit very little torque, whereas if the rotation reverses, spring 172 will tend to contract and will transmit substantial torque between hub 174 and 176. [.] Where, as in the present invention, the disengaged rotational speeds are relatively low, frictional heating is not of concern and, therefore a simple inexpensive clutch such as the embodiment of FIG. 7 may be preferred.

Beginning on page 10, line 7

Although certain preferred embodiments and methods have been disclosed herein, it will be apparent from the foregoing disclosure to those skilled in the art that variations and modifications of such embodiments and methods may be made without departing from the spirit and scope of the invention. For example, although in the illustrative embodiment of FIGS. 1-4 the vanes that provide the viscous dampening comprise rotors and stators that shear a viscous fluid, other velocity-proportional viscous dampening assemblies may be advantageously used in

accordance with the present invention, such as [turbine vanes or, as shown in FIG. 7] a plurality of fixed turbine vanes 200 attached to housing 202 interspersed with a plurality of rotating turbine vanes 204 attached to shaft 206 of reel 24 as shown in FIG. 9 or, as shown in FIG. 8, a plurality of paddles 190 attached to a hub 192 disposed within chamber 60 containing the viscous fluid. Accordingly, it is intended that the invention shall be limited only to the extent required by the appended claims and the rules and principles of applicable law.

What is claimed is:

1. An apparatus for storing an elongate member comprising:
a support frame,⁵
a spool rotatably supported by said support frame, said spool having a cylindrical body and a pair of flanges extending radially outward from opposite ends of said cylindrical body;
an elongate member wound about said spool, said elongate member having a free end
extending from said support frame and a fixed end fixed to said spool;
¹²
a spring rewind motor operatively disposed between said support frame and said spool, said spring rewind motor ~~being capable of~~ exerting a torque on said spool for counteracting a rotational displacement of said spool ~~from an initial position~~ in a first rotational direction caused by the paying out of said elongate member from said spool;
²²
a viscous clutch assembly operatively disposed between said spool and said support frame to exert a retarding torque between said spool and said support frame, said viscous clutch assembly comprising a housing defining a sealed chamber, a viscous liquid contained therein,
²⁶
^{28, 30}
and a plurality of vanes disposed in said sealed chamber; and
²⁵
³⁰
a unidirectional clutch assembly operatively disposed between said spool and said support frame, said unidirectional clutch assembly operating to disengage said viscous clutch assembly when said spool is rotated in said first rotational direction, thereby permitting ~~{said spool to rotate}~~ the paying out of said elongate member from said spool without said viscous clutch exerting a substantial retarding torque, said unidirectional clutch assembly further operating to engage said viscous clutch assembly such that said viscous clutch exerts a retarding torque between said spool and said frame for limiting rotational velocity of said spool when said

spool is rotated in a second rotational direction for rewinding said elongate member onto said spool.

9. An apparatus for storing an elongate member comprising:
 - a support frame;
 - a spool rotatably supported by said support frame, said spool having a cylindrical body and a pair of flanges extending radially outward from opposite ends of said cylindrical body;
 - an elongate member wound about said spool, said elongate member having a free end extending from said support frame and a fixed end fixed to said spool, said free end of said elongate member unwinding from said spool when said spool is rotated in a first rotational direction;
 - a spring rewind motor operatively disposed between said support frame and said spool, said spring rewind motor ~~being capable of~~ exerting a torque on said spool for ~~counteracting a rotational displacement of said spool from an initial position in a first~~ retracting said elongate member onto said spool in a second rotational direction; and
 - a unidirectional speed retarding apparatus disposed between said spool and said support frame, said unidirectional speed retarding apparatus comprising viscous clutch means and unidirectional clutch means, said viscous clutch means comprising means for providing a velocity-dependent retarding torque between said spool and said support frame, said unidirectional clutch means comprising means for disengaging said viscous clutch assembly when said spool is rotated in said first rotational direction for paying out said elongate member, thereby permitting said spool to rotate without said viscous clutch exerting a substantial retarding torque, said unidirectional clutch means further comprising means to engage said viscous clutch assembly such that said viscous clutch exerts a retarding torque between said spool and said frame for limiting rotational velocity of said spool when said spool is rotated in ~~at~~ said second rotational direction for retracting said elongate member.

17. (new) An apparatus for storing an elongate member comprising:
 - a support frame;

a spool rotatably supported by said support frame for supporting an elongate member wound thereabout, said spool being capable of rotating in a first direction for paying out a length of said elongate member and in a second direction for rewinding said elongate member;

a spring rewind motor operatively disposed between said support frame and said spool, said spring rewind motor exerting a torque on said spool urging said spool in said second direction for rewinding said elongate member;

a viscous clutch assembly operatively disposed between said spool and said support frame to exert a retarding torque between said spool and said support frame, said viscous clutch assembly comprising a housing defining a sealed chamber, a viscous liquid contained therein, and a plurality of vanes disposed in said sealed chamber; and

a unidirectional clutch assembly operatively disposed between said spool and said support frame, said unidirectional clutch assembly operating to disengage said viscous clutch assembly when said spool is rotated in said first rotational direction and to engage said viscous clutch assembly when said spool is rotated in said second direction such that said viscous clutch exerts a retarding torque on said spool for limiting a rotational velocity of said spool when said spool is rewinding said elongate member, but does not exert a retarding torque on said spool when said spool is paying out a length of said elongate member.

18. (new) The apparatus of claim 17, wherein:

said vanes comprise a plurality of stator disks and rotor disks defining a plurality of annular gaps therebetween, such that said viscous liquid is sheared in said plurality of annular gaps to provide a multi-plate viscous dampening.

19. (new) The apparatus of claim 1, wherein:

said vanes comprise a plurality of paddles.

20. (new) The apparatus of claim 9, wherein:

said vanes comprise a plurality of paddles.